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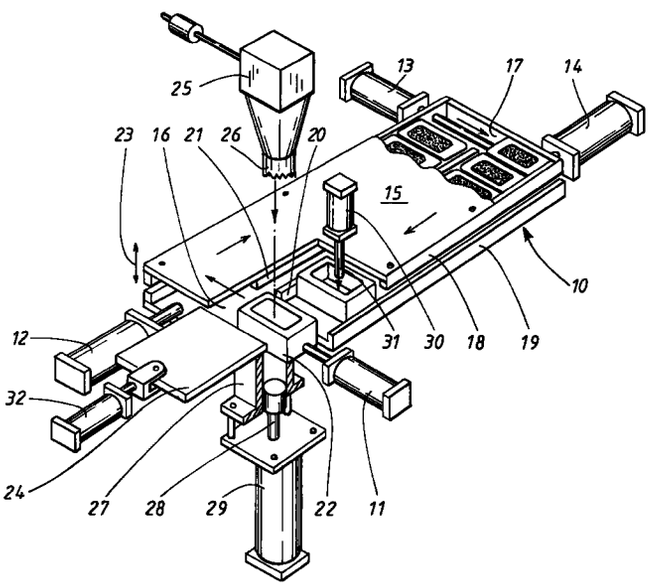
(71) Applicant: **Polima AB**
574 28 Vetlanda (SE)

(72) Inventor: **Gerhardson, Gunnar**
574 31 Vetlanda (SE)

(74) Representative:
Graudums, Valdis et al
Albihns Patentbyra Göteburg AB
P.O.Box 142
401 22 Göteborg (SE)

(54) Arrangement for press-moulding chip material

(57) The invention relates to a pressing machine for manufacturing of products such as centre plugs for bobbins, pallet blocks, etc., from wood fibre material supplemented with hardenable binder. The pressing machine has a curing chamber (10) with a channel system formed therein, where hollow moulding tools (22) are transported after having been filled with wood fibre material. The distance, in the height direction, between the inner side of the curing chamber's roof and its internal bottom side is adjustable by means of an adjustment device (23), so that said roof's inner side and bottom inner side form closures for the upper and lower parts of the moulding tools and thereby allow replacement of the moulding tool's format, for example for another mould height.



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Description

The invention relates to an arrangement for manufacturing products, for example centre plugs for bobbins, pallet blocks, etc., of wood fibre material in the form of chips or shavings supplemented by hardening binder, particularly of the heat-curable type.

STATE OF THE ART

Press machines (presses) for rational and efficient production of products based on wood fibre material in the form of chips and/or shavings are known. One example of such a machine is described in published Swedish application 466 092. The arrangement shown and described therein implies a continuous flow of a number of moulds into a heating chamber. In the heating chamber, each mould is supported individually in a cassette. The cassettes are externally dimensioned based on a fixed channel system which has a certain length and which has predetermined lateral dimensions. The internal height of the cassettes is completely fixed by the height of the mould, since each cassette's top and bottom has the specific purpose of keeping the mould shut during hardening.

The construction of the cassette in the known machine moreover means that the pressing of the chip material and the ejection of the ready product cannot be carried out in the channel system itself. The known machine is therefore provided with a separate pressing and ejection unit connected to the heating chamber.

For manufacturing products where, for example, the height dimension is different from that determined by the individual cassettes, new cassettes have to be manufactured and additionally the channel system has to be restructured so that it is filled out by the new cassettes. In practice this means that a completely new heating chamber has to be built.

On top of this comes the fact that the separate pressing and ejection unit has to be adapted to the new height dimension, which in reality means a completely new unit.

The known arrangement has its field of use in such applications where products can be manufactured in very large series without the need for dimensional changes.

In situations where products are required which have dimensions other than the nominal ones for which the machine is constructed, such a desire can only be commercially fulfilled if the order relates to very large series.

With regard to dimensions, e.g. only a small change in the height of the desired pressed products means in principle the same total restructuring of the machine as for a completely new design of the pressed product.

OBJECT OF THE INVENTION:

The object of the invention is to provide a press machine which considerably increases the degree of freedom available for dimensional changes in the products intended for pressing, in particular concerning the height dimension, without major operations having to be performed on the machine.

The invention also has the object of providing a press machine where the curing chamber is integrated with the pressing unit.

SUMMARY OF THE INVENTION:

The invention thus provides an arrangement for manufacturing products, for example centre plugs for bobbins, pallet blocks etc., from hardenable wood fibre material such as chip/shaving material supplemented with binder.

The arrangement comprises a plurality of moulding tools, a device for supplying said material to the tools, a device for compressing the supplied material, a curing chamber defining a channel system for the moulding tools, an arrangement for transporting the moulding tools in the channel system and an arrangement for ejecting ready products from the tools.

The arrangement is characterized in that the curing chamber comprises a pair of opposed wide sidewalls which with their inner sides form an upper part and a lower part respectively of the moulding tool, and in that an adjustment device is arranged to adjust the distance between said inner sides of the wide sidewalls.

In a preferred embodiment the wide sidewalls form the top and bottom respectively of the curing chamber, and the top is formed with an openable part which defines a supply position and compression position in the channel system. The arrangement for supplying the chip material is thereby placed above said openable part, and the arrangement for compressing the material is placed below the openable part. In the open condition, the openable part provides a filling opening for the material and in a closed condition said part forms a counter-pressure plate for the compression device.

The openable part is preferably so arranged that, in the channel system, it also frees the most recently previous moulding tool, whereby an ejector for ready products is arranged in the position for said most recently previous tool.

In a practical embodiment, the compression device is connected to the bottom of the curing chamber by means of a material chamber which is open towards the curing chamber, whereby a press cylinder is operatively connected with said material chamber.

In one embodiment the channel system for the moulding tools comprises at least two parallel channels, whereby the narrow sidewalls of the curing chamber at least partially form guides in said channels, and at least one additional inner guide arrangement is arranged

inside the chamber and ends at a distance from the two opposed narrow sidewalls such that a moulding tool can also be transported perpendicular to the direction of said two parallel channels.

In one embodiment the curing chamber comprises a substantially parallelapipedical housing, whereby a cylinder for transporting the moulding tools in the channel system is arranged at each end face of the housing, besides which the openable part comprises a corner part of the roof, which is movable in translating motion forwards and backwards by a cylinder.

In one embodiment the adjustment device comprises a mechanical and/or hydraulic arrangement for raising and lowering the top of the curing chamber.

Said heat-curing is suitably achieved by heat supply from a heating element supported by the top and/or bottom wall of the curing chamber.

BRIEF DESCRIPTION OF THE DRAWING:

In the sole accompanying drawing, the construction of a press machine according to a preferred embodiment of the invention is shown schematically.

Reference numeral 10 generally denotes a curing or heating chamber supported in a machine frame (not shown). The curing chamber is parallelapipedical in shape and in each of the end areas of the chamber there are cylinders 11, 12, 13 and 14.

The curing chamber is separated along a horizontal plane and has a roof or top 15 and a bottom 16. On the short and long sides of the roof and the bottom there are rim portions 17-19 (only certain ones shown) formed as guides, and internally in the curing chamber there is an additional guide arrangement comprising a pair of inner guides 20, 21 which are mutually parallel and parallel with the rim portions 17-19. The inner guides 20, 21 end at a distance from the respective short sides of the curing chamber 10.

In the shown embodiment the guides form a channel system constituting a rectangular path for the moulding tools 22. These moulding tools are hollow all the way through and thus have an open upper part and an open lower part and, in the depicted embodiment, are substantially parallelapipedical and dimensioned for being accommodated with a sliding fit in said channel system.

An arrangement for height adjustment (schematically shown by double arrow 23) of the curing chamber's roof 15 is arranged so that the roof, with its inside, can be positioned at a predetermined constant distance from the bottom plane of the curing chamber. Said adjustment device can for example comprise a set of threaded rods/bars, each of which is provided with an adjustment nut and locked to the bottom as well as being fed through an aperture in the roof with the adjustment nuts resting against the underside of the roof. Alternatively the adjustment device can comprise suitable arrangements of jacks, mechanical or hydraulic.

The height adjustment device 23 is adjusted for operation so that the roof's inside wall upwardly closes the mould.

With the exception of certain positions (which will be dealt with later) in the channel system, the inside bottom (base) of the curing chamber shuts the bottom of the moulding tools during their transport in the channel system.

The roof 15 of the curing chamber has a removable part 24 in a corner region of the roof. In the shown embodiment the part 24 is formed as a translatory openable and closeable plate. The translatory movement is achieved by a cylinder 32 and the plate's movement is controlled in suitable guides (not shown). Said height adjustment device 23 is also arranged so that the plate follows the movement of the roof 15.

The plate 24 is dimensioned so that it frees a supply station in the channel system, said supply channel being for the chip-like material which is to be filled into the moulding tool, as well as freeing an ejection position for the ready product.

In the supply station there is a filler 25, which for example has metering scales for the chip material, the filler having a filling tube 26 positioned vertically directly above a filling chamber 27. The filling chamber 27 is directly connected to the curing chamber's bottom and frees an opening in this for supplying chip material into the filling chamber. Piston 28 of a press cylinder 29 operates inside the filling chamber 27. An ejector 30 with a vertically forwardly and backwardly moving ejector element 31 is arranged in said ejector station. In the bottom of the curing chamber, vertically below the ejector, there is a hole (not shown) for feeding out ready products to a suitable transport tube.

The curing chamber's 10 heat supply is achieved by means of thermostatically controlled heating elements (not shown) arranged in the upper part of the roof and the lower part of the bottom.

In the accompanying figure, the plate 24 is shown in a retracted position and thereby frees the supply station for chip material and the ejector station for the ready product. The material falls down through the empty tool in the supply station and moves down into the filling chamber 27. At the same time as this is happening the ejector 30 releases the ready product from the moulding tool in the ejection position.

In the next step, the cylinder 32 displaces the plate 24 back into the roof so that the interior of the plate will form a continuous planar inside the roof or top.

The cylinder 29 is activated and the piston 28 moves up and compresses the chip material against the plate 24 which functions as a counter-pressure plate.

When the compression is finished, the piston 28 returns and the cylinder 11 then starts to function after the piston 12 has opened a position in the channel system for the newly filled moulding tool and the tool with the newly compressed material is displaced one step in the channel system.

The cylinder 13 takes care of displacement in the lateral direction in the rectangular path of the chip material present in the moulding tool during curing, and the cylinder 14 takes care of forward feeding in the channel system to the filling and ejection position of the individual moulding tools.

Normally there is a position in the rectangular path which is free from moulding tools, and this free position controls the activation sequence of the cylinders 11-14.

The plate 24 will release (free) a moulding tool which has no chip material as soon as this tool is in a filling position and the plate will likewise release a tool in the ejection position as soon as this tool is in such a position.

Since the ejection is done at the same time as filling, the travel-through time in the channel system is shortened.

The previously mentioned adjustment device 23 also operates on the counter-pressure plate 24 and adjusts this into the same height position as the rest of the roof.

Moulding tools with the same outer dimensions as shown in the figure, but with another height dimension, can easily be introduced into the channel system by corresponding height adjustment of the roof 15 by means of the adjustment device 23.

Replacement of moulding tools and height adjustment occurs quickly and with a minimum of operator involvement.

Since the press and filling stations are integrated with the curing chamber there is also no need for a complete rebuild of a separate press and ejector unit.

Although the invention has been described in relation to a single track rectangular path it is clear that other channel shapes are possible with the scope of the following claims.

Likewise the movement and movement pattern of the counter-pressure plate can be different than that which has been described. For example, the plate can be drawn back in two steps so that it first frees the ejector position and then the filling position.

It is to be understood that such embodiments which are not explicitly described, are to be covered by that which is defined in the accompanying claims.

Claims

1. Arrangement for manufacturing products, for example centre plugs for bobbins, pallet blocks, etc., from hardenable wood fibre material such as chip/shaving material supplemented with binder, comprising a plurality of moulding tools (22), a device (25) for supplying said material to the tools, a device (29) for compressing the supplied material, a curing chamber (10) defining a channel system for the moulding tools, an arrangement (11-14) for transporting the moulding tools in the channel system, and an arrangement (30) for ejecting ready products from the tools, **characterized in that** the curing chamber (10) comprises a pair of opposed wide sidewalls which with their inner sides form an upper part and a lower part respectively of the moulding tools, and in that an adjustment device (23) is arranged to adjust the distance between said inner sides of the wide sidewalls.

2. Arrangement according to claim 1, **characterized in that** the wide sidewalls form a top (15) and bottom (16) respectively of the curing chamber, and in that the top is constructed with an openable part (24) which defines a supply and compression position in the channel system, in that the device (25) for supplying said material is placed above said openable part (24), in that the device (29) for compressing the material is placed below the openable part, whereby the openable part (24), in an open condition, provides a filling opening for the material and, in the closed condition, forms a counter-pressure plate for the compression device (28, 29).

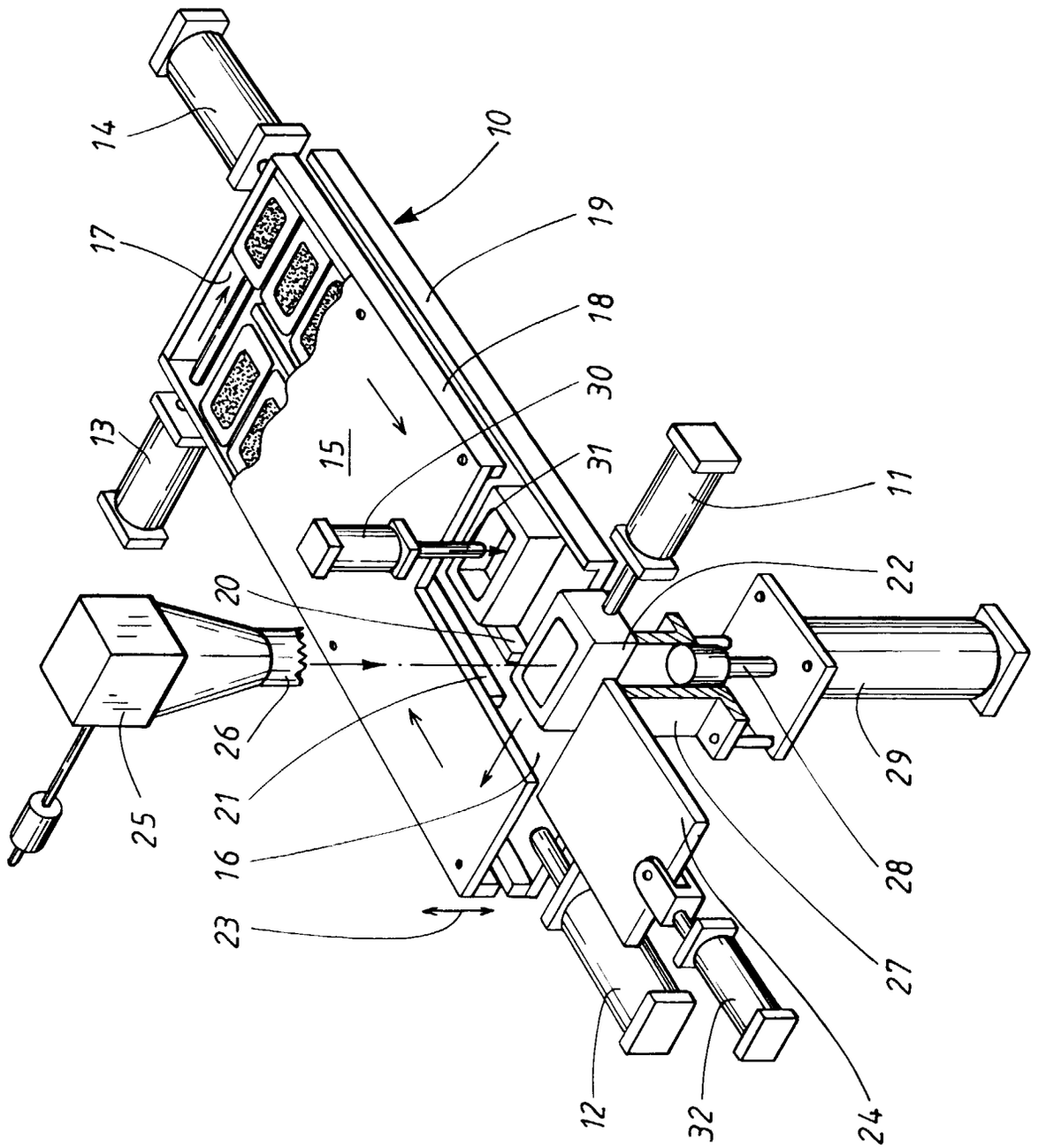
3. Arrangement according to claim 2, **characterized in that** the openable part (24) is arranged so that it also frees the most recently previous moulding tool in the channel system, and in that an ejector (30) for ready products is arranged in the position for said most recently previous tool.

4. Arrangement according to any of the preceding claims, **characterized in that** the channel system for the moulding tools (22) comprises at least two parallel channels, and in that narrow sidewalls (17-19) of the curing chamber at least partially form guides in said channels, and in that at least one additional inner guide arrangement (20, 21) is arranged inside the chamber, and in that said additional guide arrangement ends at a distance from two opposing narrow sidewalls such that moulding tools can also be transported perpendicular to the direction of said two parallel channels.

5. Arrangement according to claim 4, **characterized in that** the curing chamber comprises a substantially parallelapipedical housing, in that a cylinder (11-14) for transporting the moulding tools in the channel system is arranged at each end face of the housing, and in that the openable part (24) comprises a corner part of the top (15) of the curing chamber, which is displaceable in translating motion forwards and backwards by a cylinder (32)

6. Arrangement according to any of the preceding claims, **characterized in that** the adjustment device (23) comprises a mechanical and/or hydraulic arrangement for raising and lowering the top (15) of the curing chamber.

7. Arrangement according to claim 6, **characterized in that** heating elements are arranged on the outside wall of the curing chamber's top and/or bottom wall.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